



GUEST ESSAY

There Is No Crisis of Unsustainability

Julian L. Simon

Julian L. Simon is professor of economics and business administration at the University of Maryland. He has effectively presented and defended the position that continued economic growth and technological advances will produce a less crowded, less polluted, and more resource-rich world. His many articles and books on this subject include *The Ultimate Resource*, *The Resourceful Earth*, *Population Matters*, and *The State of Humanity* (see Further Readings).

This textbook, like most others discussing environmental and resource problems, begins with the proposition that there is an environmental and resource crisis. If this means that the situation of humanity is worse now than in the past, then the idea of a crisis—and all that follows from it—is dead wrong. In almost every respect important to humanity, the trends have been improving, not deteriorating.

Our world now supports 5.8 billion people. In the 19th century, the earth could sustain only 1 billion. And 10,000 years ago, only 1 million people could keep themselves alive. People are living more healthily than ever before, too.

One would expect lovers of humanity—people who hate war and worry about famine in Africa—to jump with joy at this extraordinary triumph of the human mind and human organization over the raw forces of nature. Instead, they lament that there are so many human beings and wring their hands about the problems that more people inevitably bring.

The recent extraordinary decrease in the death rate—to my mind, the greatest miracle in history—accounts for the bumper crop of humanity. It took thousands of years to increase life expectancy at birth from the 20s to the 30s. Then, in just the last 200 years, life expectancy in the advanced countries jumped from the mid-30s to the 70s. And, starting well after World War II, life expectancy at birth in the poor countries, even the very poorest, has leaped upward (averaging 64 in 1996) because of progress in agriculture, sanitation, and medicine. Average life ex-

pectancy at birth in China, the world's most populous country, was 70 in 1996, an increase of 26 years since the 1950s. Is this not an astounding triumph?

In the short run, another baby reduces per capita income by causing output to be divided among more people. And as the British economist Thomas Malthus argued in 1798, more workers laboring with existing capital results in less output per worker. However, if resources are not fixed, then the Malthusian doctrine of diminishing resources, resurrected by today's doom-and-gloom analysts, does not apply. Given some time to adjust to shortages with known methods and new inventions, free people create additional resources.

It is amazing but true that a resource shortage resulting from population or income growth usually leaves us better off than if the shortage had never arisen. If firewood had not become scarce in 17th-century England, coal would not have been developed. If coal and whale oil shortages hadn't loomed, oil wells would not have been dug.

The prices of food, metals, and other raw materials have been declining by every measure since the beginning of the 19th century and as far back as we know; that is, raw materials have been getting less scarce instead of more scarce throughout history, defying the common-sense notion that if one begins with an inventory of a resource and uses some up, there will be less left. This is despite, and indirectly because of, increasing population.

All statistical studies show that population growth doesn't lead to slower economic growth, though this defies common sense. Nor is high population density a drag on economic development. Statistical comparison across nations reveals that higher population density is associated with faster rather than slower growth. Drive around on Hong Kong's smooth-flowing highways for an hour or two, and you will then realize that a large concentration of human beings in a small area does not make comfortable existence impossible. It also allows for exciting economic expansion if the system gives individuals the freedom to exercise their talents and pursue economic opportunities. The experience of densely populated Singapore makes it clear that Hong Kong is not unique, either.

The environment is suffering critical stress. . . . Our massive tampering with the world's interdependent web of life—coupled with the environmental damage inflicted by deforestation, species loss, and climate change—could trigger widespread adverse effects, including unpredictable collapses of critical biological systems whose interactions and dynamics we only imperfectly understand. Uncertainty over the extent of these effects cannot excuse complacency or delay in facing the threats. . . . No more than one or a few decades remain before

the chance to avert the threats we now confront will be lost and the prospects for humanity immeasurably diminished. . . . Whether industrialized or not, we all have but one lifeboat. No nation can escape injury when global biological systems are damaged. . . . We must recognize the earth's limited capacity to provide for us. . . .

Also in 1992, the prestigious U.S. National Academy of Sciences and the Royal Society of London issued a joint report, their first ever, which began:

9

Q: What percentage of the global income goes to the richest 20% of the world?

In 1984, a blue-ribbon panel of scientists summarized their wisdom in *The Resourceful Earth*. Among the findings, besides those I have noted previously, were these:

- Many people are still hungry, but the food supply has been improving since at least World War II, as measured by grain prices, production per consumer, and the death rate from famines.
- Land availability won't increasingly constrain world agriculture in coming decades.
- In the United States, the trend is toward higher-quality cropland, suffering less from erosion than in the past.
- The widely published report of increasingly rapid urbanization of U.S. farmland was based on faulty data.
- Trends in world forests are not worrisome, though in some places deforestation is troubling.
- There is no statistical evidence for predictions of rapid loss of plant and animal wildlife species in the next two decades. An increased rate of extinction cannot be ruled out if tropical deforestation continues unabated, but the linkage has not yet been demonstrated.
- Water does not pose a problem of physical scarcity or disappearance, although the world and U.S. situations do call for better institutional management through more rational systems of property rights.
- There is no compelling reason to believe that world oil prices will rise in coming decades. In fact, prices may fall well below current levels.
- Compared with coal, nuclear power is no more expensive and is probably much cheaper under most circumstances. It is also much cheaper than oil.
- Nuclear power gives every evidence of costing fewer lives per unit of energy produced than does coal or oil.
- Solar energy sources (including wind and wave power) are too dilute to compete economically for much of humankind's energy needs, though for specialized uses and certain climates they can make a valuable contribution.
- Threats of air and water pollution have been vastly overblown. Air and water in the United States have been getting cleaner, rather than dirtier.

We don't say that all is well everywhere, and we don't predict that all will be rosy in the future. Children are hungry and sick; people live out lives of physical or intellectual poverty and lack of opportunity; war or some other pollution may do us in. *The Resourceful Earth* does show that for most relevant matters we've examined, total global and U.S. trends are improving instead of deteriorating.

We do not say that a better future happens automatically or without effort. It will happen because men and women—sometimes as individuals, sometimes as enterprises working for profit, sometimes as voluntary non-profit groups, and sometimes as governmental agencies—will address problems with muscle and mind, and will probably overcome, as has been usual through history.

We are confident that the nature of the physical world permits continued improvement in humankind's economic lot in the long run, indefinitely. Of course, there are always newly arising local problems, shortages, and pollution, resulting from climate or increased population and income and new technologies. Sometimes temporary large-scale problems arise. But the world's physical conditions and the resilience of a well-functioning economic and social system enable us to overcome such problems, and the solutions usually leave us better off than if the problem had never arisen. That is the great lesson to be learned from human history.

Critical Thinking

1. Do you agree with the author's contention that there is no environmental, population, or resource crisis? Explain. How is it compatible with the data presented in Figures 1-13, 1-16, and 1-20? Try to remember to answer this question again to see if your views have changed after you've finished this text.
2. Do you feel you will be better off than your parents? What do you mean by "better off"? Do you think any children you might have will be better off than you? Explain.

If current predictions of population growth prove accurate and patterns of human activity on the planet remain unchanged, science and technology may not be able to prevent either irreversible degradation of the environment or continued poverty for much of the world.

Some past short-term prophecies of environmental doom by a small number of scientists have not been borne out, and critics have used this to urge people to

ignore all warnings from scientists and environmentalists. However, the more recent warnings just cited don't represent the views of a small number of scientists but the views of the mainstream scientific community. Some analysts also point out that many of the warnings of environmental doom made in the 1960s and 1970s were averted because people realized that they might come true and worked to pass legislation and carry out individual acts to help keep them from coming true.



GUEST ESSAY

Simple Simon Environmental Analysis

Paul R. Ehrlich and Anne H. Ehrlich

Paul R. Ehrlich is Bing Professor of population studies at Stanford University. His many honors include membership in the

U.S. National Academy of Sciences, the Fellowship of the American Academy of Arts and Sciences, and the American Philosophical Society; the Crafoord Prize of the Swedish Academy of Sciences (given as the equivalent of an environmental Nobel Prize); the American Association for the Advancement of Science/Scientific American Award for Science in the Service of Mankind; and a MacArthur Prize Fellowship. Anne H. Ehrlich is a senior research associate in Stanford's Department of Biological Sciences. Her many honors include an honorary degree from Bethany College, the Global 500 Environmental Roll of Honor, and the Humanists' Award. The Ehrlichs have authored or coauthored more than 30 books and 600 articles dealing with population, the environment, ecology, and evolution.

Today, there are over 5.8 billion people in the human population, and population experts now project that it will reach a maximum size of 10–14 billion before it stops growing. It is not the number of people per se that causes concern, but the ways in which numbers, patterns of consumption, and choices of technology are now combining to destroy civilization's life-support systems. In 1992, a joint statement by the U.S. National Academy of Sciences and the British Royal Society on Population Growth, Resource Consumption, and a Sustainable World stated, among other warnings, "It is not prudent to rely on science and technology alone to solve problems created by rapid population growth, wasteful resource consumption, and harmful human practices."

Nevertheless, a few uninformed people claim that population growth is beneficial, ozone depletion is a hoax, global warming is too uncertain to justify action, the extinction of other organisms is no problem, and the degree of crowding possible in Hong Kong, Singapore,

or in the Netherlands can be accommodated over the entire planet. Julian Simon is the leading spokesperson for this view. He believes that a finite earth can hold an almost infinite number of people.

He also has maintained that resources are getting cheaper because they are infinite in supply. He believes, incorrectly, that resources are infinitely subdivisible (for example, petroleum, once it is divided into atoms, is no longer petroleum). But even if they were infinitely subdivisible, that would not make them infinite in quantity. Simon has simply resurrected a mathematical error known to the ancient Greeks (Zeno's paradox, which concluded that there is an infinite distance between any two points). He has even asserted that humanity could convert the entire universe (including itself and Simon, presumably) into copper!

Moving on from his clever "analysis," what are the facts?

- The connections among economic growth, population growth, and quality of life are much more subtle and complicated than Simon imagines. In many poor nations with rapidly growing populations, GNP *per person* has recently been shrinking, and quality of life is clearly declining.

- In *absolute numbers*, more people are hungry today than ever—over a billion, according to the World Bank—although the *proportion* of hungry people has probably been reduced somewhat in recent decades. But can food production continue to increase at a faster rate than population growth? Agriculture is already running into problems such as a "cap" on rice yields and diminishing returns from green revolution technology. Moreover, per person food production has been falling in Africa for more than two decades.

- Land availability is very likely to constrain world agriculture, especially given that widespread degradation is occurring on a major portion of the world's farmland.

How Do Major Environmental Worldviews Differ?

The conflicting views about how serious our environmental problems are and what we should do about them arise mostly out of differing **environmental worldviews**—how individuals think the world works, what they think their role in the world should be, and what they believe is right and wrong environmental behavior (ethics). Our environmental worldviews are largely the result of our education and cultural experiences.

People with widely differing environmental worldviews can take the same data, be logically consistent, and arrive at quite different conclusions (Guest Essays,

p. 26 and above) because they start with different assumptions and are often seeking answers to different questions.

Most people in today's industrial-consumer societies have a **planetary management worldview**, which has become increasingly accepted during the past 50 years. The basic beliefs of this environmental worldview include the following:

- *We are the planet's most important species, and we are in charge of the rest of nature.* This idea crops up when people talk about "our" planet, "our" earth, and "saving the earth."

- In the United States, production is now concentrated on the better-quality farmland for conservation reasons, but the amount of good land is not increasing, and even it is subject to degradation.
- The world (and the United States) is steadily losing prime farmland to urbanization.
- Trends in world forests are very worrisome—ask a biologist. Simon apparently doesn't know the difference between an old-growth virgin forest (with its crucial biodiversity intact) and a tree farm. Sadly, in most temperate regions, only a tiny fraction of old-growth forests remains even though the total area of "forest" is approximately as large as a century ago. And the diversity-rich tropical forests are being cut down at unprecedented rates.
- Biologists have uncovered convincing evidence that major losses of biodiversity have already occurred through the widespread destruction of habitats on which other organisms are totally dependent.
- Yes, there is a lot of water on this planet, but it is often not available where or when needed, and much of it is polluted. Groundwater in many areas is being removed faster than it can be recharged. Since water is essential for high-yield agriculture, its scarcity in important agricultural regions is a serious concern. Some earth scientists feel that water shortages will be the main factor limiting human population growth.
- The main problem now with oil is neither its supply nor its price, but the environmental costs of burning it and other fossil fuels, especially the injection of greenhouse (heat-trapping) gases into the atmosphere.
- Nuclear power is not cheap if the costs of development, waste disposal, decommissioning of worn-out plants, and insurance are properly factored in. The spread of nuclear weapons from use of nuclear power technology also adds enormous military defense costs.
- Nuclear power may cost fewer lives than coal if there are no major nuclear accidents, but the Chernobyl (which

may eventually cost many more lives than the coal industry) and Three Mile Island accidents convinced the public that the risk was too high. Still, the possibility that a safe fission power technology could be developed should remain part of our thinking about future energy supplies.

- A solar energy economy in which electricity is generated (using some of it to make hydrogen as a versatile, portable fuel) is considered by most experts to be a feasible major energy option.
- Air pollution is not a minor matter. Besides causing serious direct threats to human health, agriculture, and forestry, it threatens to degrade the ozone shield, which is essential to the persistence of human and many other forms of life, and may lead to climate change severe enough to cause billions of premature deaths in the next century. Air and water pollution problems in the United States were abated by pollution control efforts in the 1970s, but in the 1980s they worsened again because the population and the economy continued to grow (producing more pollutants) with little improvement in pollution abatement.

You don't have to take our word for all this. The facts are readily available in numerous sources, and you can assess whether population growth, resource consumption, and environmental deterioration are real problems. But remember, although putting huge effort into solving nonexistent or trivial problems would be wasteful, failing to address or postponing actions on the truly serious problems we have outlined in this essay would be very costly indeed.

Critical Thinking

1. How can Simon and the Ehrlichs take mostly the same data and come to such different conclusions?
2. Whom do you believe? Why?

■ *There is always more.* The earth has an essentially unlimited supply of resources. If we deplete a resource, we will find substitutes. To deal with pollutants, we can invent technology to clean them up, dump them into space, or move into space ourselves. If we extinguish other species, we can use genetic engineering to create new and better ones.

■ *All economic growth is good, more economic growth is better, and the potential for economic growth is limitless.*

■ *Our success depends on how well we can understand, control, and manage the earth's life-support systems mostly for our benefit.*

People with this (and related) environmental worldviews seek answers to questions such as: How can we keep economic growth or throughput of resources growing exponentially? How can we become better managers of the entire planet? How can we control and manage the pollutants and wastes we produce and the environmental degradation we cause? Several variations of this environmental worldview are discussed in Section 28-1.

A small but growing number of people question the planetary management worldview and are searching for a better one. One environmental worldview is known as the earth wisdom worldview. It has the

Sustainability Article #1

How do we bring about changes in human behavior that result in actively protecting and preserving our natural world? How can we repair damage to habitats and reduce damage in the future? Whatever methods are used, most likely everyone will pay the costs. The questions that society must decide involve balancing the value of material wealth and the value of environmental health. Until recently, that balance has favored production and consumption at the expense of natural resources because society has not understood nor put a price on the value of a healthy environment. Placing a value on actions necessary to achieve and maintain a healthy environment is important, because achieving it will cost money. Producing goods in a way that does not damage the environment may initially result in higher prices and fewer material goods, but we may be willing to pay that price for a healthy world. Others argue that new technologies will be developed that will help increase production without damaging habitats. But such developments take time and money, too, and may be short-sighted.

If we are willing to pay for a healthy environment, it is the individual who will probably lead the fight. Although business and government are crucial decision-making components driving the economy, politicians tend to act only when they're convinced that the voters want them to, and businesses produce goods and services that the public demands and will

pay for. Sustainable change must be supported at the ultimate grassroots level because it is our cumulative individual material needs and wants that generate the production and economic activity that leads to the use of our resources.

For us to use limited resources most effectively and wisely, it will be important to distinguish "needs" from "wants." Needs are necessities, or things we must have. Wants are luxuries, or non-essential things that we would like to have for enjoyment or convenience. The distinction between the two may vary between individuals and even countries. What satisfies as a basic need for shelter in one country, for example, may be totally unacceptable in another. Perhaps because our economy does so well in meeting our basic needs, we are now able to focus on the environmental implications of our economic activity. We have tended to measure progress in terms of the quantity of goods and services, but now we are challenged to consider the quality of life as well, and to value things that have not historically had a price tag: a wilderness, a sparkling stream, clean air, and so on. Do we need more goods and services? How much do we need?

Adapted with permission from Jackson, Judith (Ed.), *Environomics*, Canadian Foundation for Economic Education: Toronto, Ontario, 1996.

continued

Sustainability Article #2

Over the past century, we have managed ecosystems in at least five different ways. Until the middle of this century, the industrialized world tended to see the environment as an infinite supply of resources and a bottomless sink for wastes. This first approach, often referred to as "frontier economics," prevails even today in some developing nations and some sectors of industrialized countries. The economy was seen to exist in almost complete isolation, separate from the environment. Resources were seen as being abundant. So, for example, an increased demand for forest products could be met simply by building a new mill. The more pressing problem with frontier economics was the scarcity of workers, not of resources. Consequently, the destruction of the environment made little difference, because fresh territory and fresh resources always were within reach. It also can be argued that a further consequence of the frontier economics approach was the development of separate sciences. Forests or crops, for example, never were considered in relation to the soil that held them in place, to the rivers that ran through them, or to the animals that lived within them. Government programs, university faculties, and economic theories all perpetuated this rather unconnected and restrictive outlook on the world.

By the late 1960s and 1970s, many people in industrialized nations began to recognize the interdependence of man and the environment, and they became increasingly concerned about pollution. Although the environment continued to be less important than economics, the need to conserve and maintain resource stocks became a consideration for the first time. During this period policies were introduced to make polluters more accountable for the damage they caused and the relationship among land, soil, water, air, and animal life was made a factor within the traditional sciences. Under this second approach, known as "resource management," the environmental implications of resource removal was evaluated. These assessments, however, often were made as an afterthought, following the planning stages of a given development project. Consequently, business decision-making processes continued largely as before, with environmental consequences considered after the basic decisions were made.

Resource management remains, to a large extent, the dominant mode of thinking about the environment and economic development. Nevertheless, environmental awareness is growing at an increasingly rapid pace. "Selective environmentalism," a third approach, reflects a contrasting style of thinking. It can best be described as a "doing my part" approach, where consumers and agencies express their concerns about environmental degradation by making selected efforts to stop it. This desire to do something for the environment has led to many "environmentally friendly" products and initiatives, such as municipal recycling programs. However, selective environmentalism places little, if any, emphasis on cost-effectiveness. Moreover, it makes the assumption that the economy will simply take care of itself.

"Deep environmentalism," the fourth approach, disavows economics to the furthest degree. Here, the human race is seen as no more than one of many species that share this planet. Clearly, deep environmentalism is the antithesis of frontier economics. Where frontier economics gave little attention to the environment, deep ecology gives little attention to the economy.

The most balanced approach considers "sustainable communities." This fifth outlook supports the view that a healthy environment is essential for a sound and prosperous economy. Society, economics, and the environment are, therefore, seen as elements of a mutually supporting ecosystem and are automatically taken into account before decisions are made. A sustainable community approach holds that resources must be treated on the basis of their future, as well as their present, value. With today's unprecedented threats of global change and worldwide degradation of environmental resources, the need to integrate environmental, social, and economic goals in the broader ecological context has never been greater.

Adapted from "Ecosphere," Environment Canada: The State of Canada's Environment-1991. Ottawa: Supply and Services Canada, 1991, pp. 1-5, 1-7, 1-8. Adapted with the permission of the Minister of Public Works and Government Services Canada, 2000.

ALDO LEOPOLD

Thinking Like a Mountain

A deep chesty bawl echoes from rimrock to rimrock, rolls down the mountain, and fades into the far blackness of the night. It is an outburst of wild defiant sorrow, and of contempt for all the adversities of the world.

Every living thing (and perhaps many a dead one as well) pays heed to that call. To the deer it is a reminder of the way of all flesh, to the pine a forecast of midnight scuffles and of blood upon the snow, to the coyote a promise of gleanings to come, to the cowman a threat of red ink at the bank, to the hunter a challenge of fang against bullet. Yet behind these obvious and immediate hopes and fears there lies a deeper meaning, known only to the mountain itself. Only the mountain has lived long enough to listen objectively to the howl of a wolf.

Those unable to decipher the hidden meaning know nevertheless that it is there, for it is felt in all wolf country, and distinguishes that country from all other land. It tingles in the spine of all who hear wolves by night, or who scan their tracks by day. Even without sight or sound of wolf, it is implicit in a hundred small events: the midnight whinny of a pack horse, the rattle of rolling rocks, the bound of a fleeing deer, the way shadows lie under the spruces. Only the ineducable tyro can fail to sense the presence or absence of wolves, or the fact that mountains have a secret opinion about them.

My own conviction on this score dates from the day I saw a wolf die. We were eating lunch on a high rimrock, at the foot of which a turbulent river elbowed its way. We saw what we thought was a doe fording the torrent, her breast awash in white water. When she climbed the bank toward us and shook out her tail, we realized our error: it was a wolf. A half-dozen others, evidently grown pups, sprang from the willows and all joined in a welcoming *mêlée* of wagging tails and playful mauplings. What was literally a pile of wolves writhed and tumbled in the center of an open flat at the foot of our rimrock.

In those days we had never heard of passing up a chance to kill a wolf. In a second we were pumping lead into the pack, but with more excitement than accuracy: how to aim a steep downhill shot is always confusing. When our rifles were empty, the old wolf was down, and a pup was dragging a leg into impassable slide-rocks.

We reached the old wolf in time to watch a fierce green fire dying in her eyes. I realized then, and have known ever since, that there was something new to me in those eyes—something known only to her and to the mountain. I was young then, and full of trigger-itch; I thought that because fewer wolves meant more deer, that no wolves would mean hunters' paradise. But after seeing the green fire die, I sensed that neither the wolf nor the mountain agreed with such a view.

Since then I have lived to see state after state extirpate its wolves. I have watched the face of many a newly wolfless mountain, and seen the south-facing slopes wrinkle with a maze of new deer trails. I have seen every edible bush and seedling browsed, first to anaemic desuetude, and then to death. I have seen every edible tree defoliated to the height of a saddle-

horn. Such a mountain looks as if someone had given God a new pruning shears, and forbidden Him all other exercise. In the end the starved bones of the hoped-for deer herd, dead of its own too much, bleached with the bones of the dead sage, or molder under the high-lined junipers.

I now suspect that just as a deer herd lives in mortal fear of its wolves, so does a mountain live in mortal fear of its deer. And perhaps with better cause, for while a buck pulled down by wolves can be replaced in two or three years, a range pulled down by too many deer may fail of replacement in as many decades.

So also with cows. The cowman who cleans his range of wolves does not realize that he is taking over the wolf's job of trimming the herd to fit the range. He has not learned to think like a mountain. Hence we have dustbowls, and rivers washing the future into the sea.

We all strive for safety, prosperity, comfort, long life, and dullness. The deer strives with his supple legs, the cowman with trap and poison, the statesman with pen, the most of us with machines, votes, and dollars, but it all comes to the same thing: peace in our time. A measure of success in this is all well enough, and perhaps is a requisite to objective thinking, but too much safety seems to yield only danger in the long run. Perhaps this is behind Thoreau's dictum: In wildness is the salvation of the world. Perhaps this is the hidden meaning in the howl of the wolf, long known among mountains, but seldom perceived among men.

